

Mechanical Tools for Fuel Reduction Treatments


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Forest Operations Research
 Welcome
 In addition, the Unit is involved in demonstrations, technical presentations. Our stakeholders include forest industry, the nation's other government agencies, private landowners, contractors, fire manufacturers, and university researchers. Many of the Unit's staff in cooperation with universities, forest industry, and independent scientists in the Unit are nationally and internationally recognized, serving on committees and numerous professional societies.

- Slides in Notebook
- Biomass Catalog
- FE Glossary


Acknowledgements

- Joint Fire Sciences Program
- Croatan, Kisatchie, DeSoto and others
- Manufacturers and contractors
- Dry Forest Mechanized Trials
- San Dimas and Missoula Tech Centers

Outline

- ✿ Principles of tools
- ✿ Defining the task
- ✿ Overview of mechanical treatment equipment
 - BREAK
- ✿ Case Studies & Videos

Tools are transformers



Tools are adapted for a specific job



A tool for every job



You can never have too many tools



~~You can never~~ have too many tools

- ✖ Tools that aren't functional (Doo Blaster)
- ✖ Tools that are too complicated to use (have you programmed your VCR today?)
- ✖ Duplicate tools (2 sets of hog ring pliers)
- ✖ Tools you don't need (no hogs)
- ✖ Over-priced tools (digital tape measure)

"What do you need that for?"

Principles of Tools

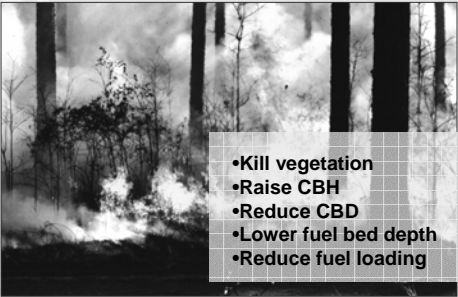
- ✿ There is a tool for every job
- ✿ Using the wrong tool breaks things
- ✿ Using the right tool is faster, cheaper, better
- ✿ Match the right tool to the job
 - Know the job
 - Know the tools

Damage occurs ...




Match the tool to the job






Defining the Task

- Kill vegetation
- Raise CBH
- Reduce CBD
- Lower fuel bed depth
- Reduce fuel loading



Defining the Task



Define the constraints

Santa Fe Watershed, Santa Fe NF

Define the constraints

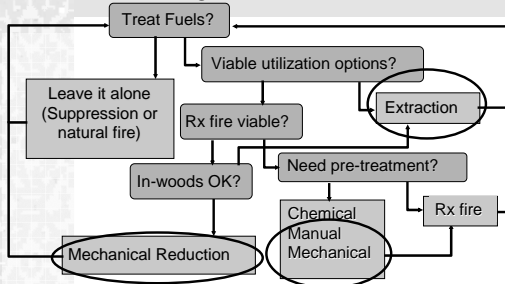


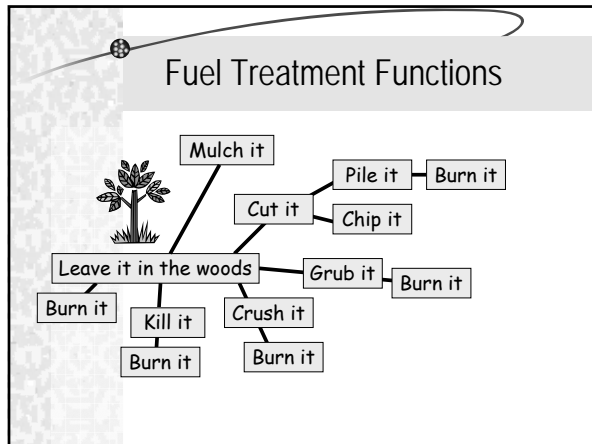
Well-defined Prescription

- ✿ What needs to be treated
 - Mulch, chips, or dirt
- ✿ What needs to be avoided
- ✿ What are constraints
- ✿ What are the follow-up plans

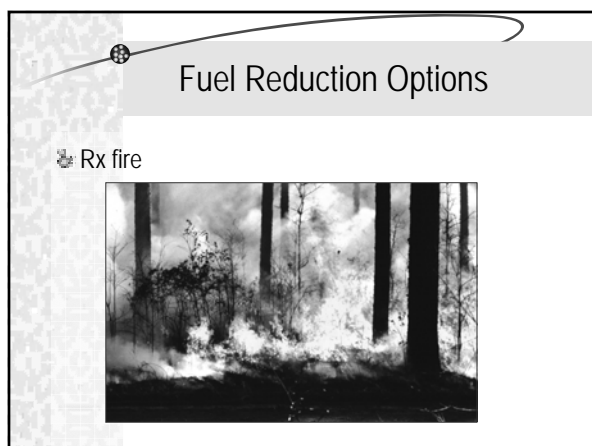
The closer the match of tool to job, the cheaper and more effective the treatment will be.

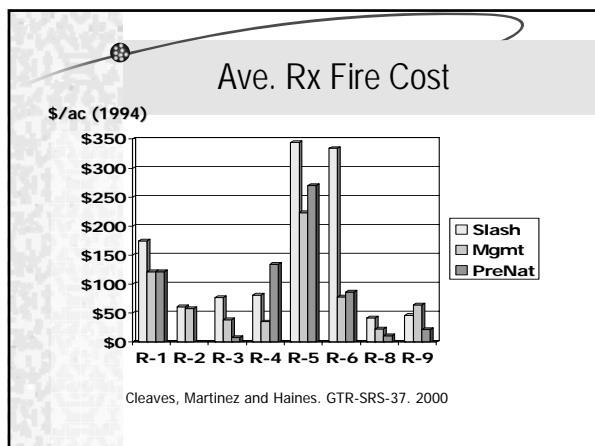
Manager's Decision Tree

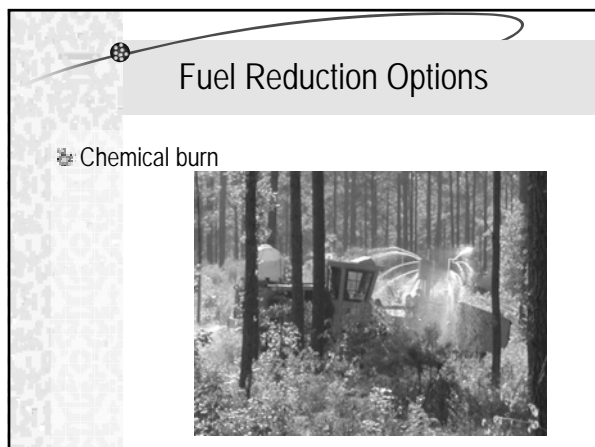


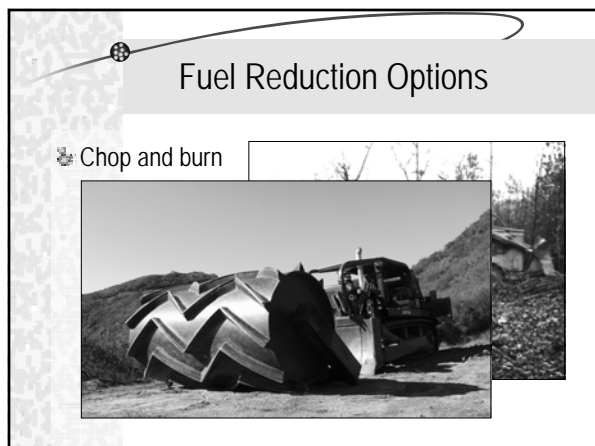


















Fuel Reduction Options




Grubbing







Fuel Reduction Options




Hand lop (leave, scatter, or pile)

Santa Fe Watershed, NM








Manual Operations



Fell and pile: \$22-30/ton




Slashing: \$40-100/ac

Fuel Reduction Options


✿ Mechanical pile and burn

FB: trip & trample
\$160/ac




Dozer Piling

\$45-100/acre



Grapple Piling

Moderate slope: \$200-300/ac
Steep slope: \$500-800/ac



In-woods chipping

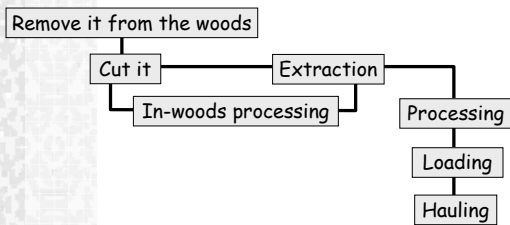


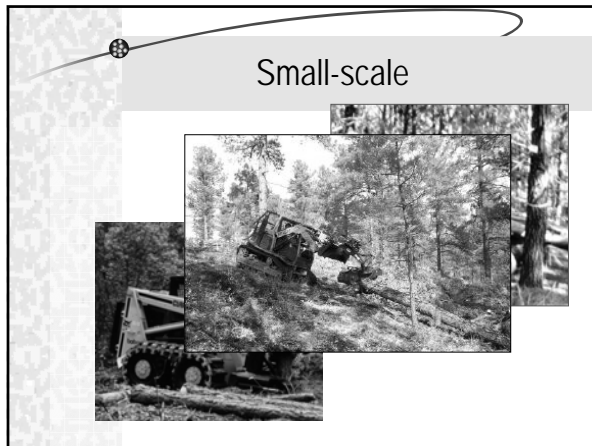
Fuel Reduction Options

🌳 Mechanical reduction

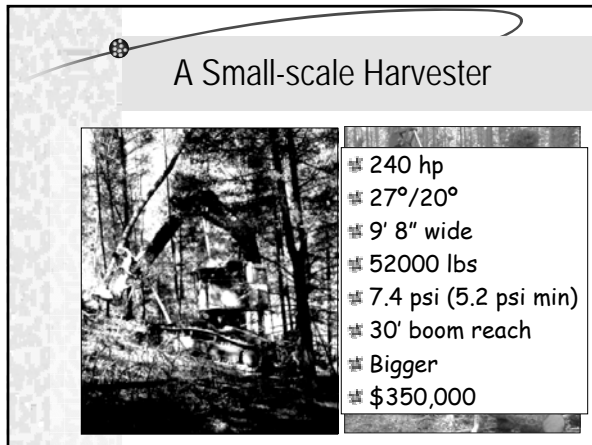


Fuel Treatment Functions



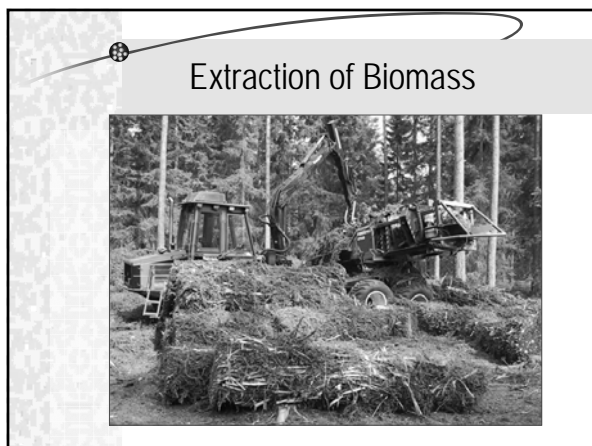


Small-scale



A Small-scale Harvester

- 240 hp
- 27°/20°
- 9' 8" wide
- 52000 lbs
- 7.4 psi (5.2 psi min)
- 30' boom reach
- Bigger
- \$350,000



Extraction of Biomass

W. Juniper



Roadside disposal



Roadside Disposal



- \$7/ton burning
- Throughput (max 10 tons/hr)
- Primary value is "smokeless" disposal

Roadside processing



System of tools



Masticators

Mechanical Reduction Tools

- Type of prime mover (rubber-tired, tracked, RT)
- Type of cutterhead (horiz. Vs. vertical shaft)
- Type of attachment (boom-mounted, direct)



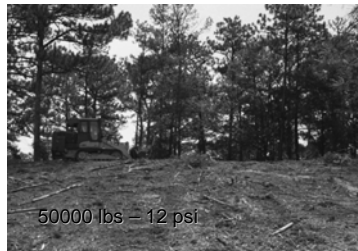
Features

- Size
 - Width
 - Swing
 - Reach
 - Turn radius




Features

- Weight



Features

POWER



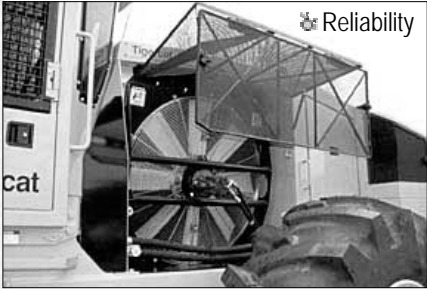
Features

Maintainability




Features


Reliability



Features

 Safety

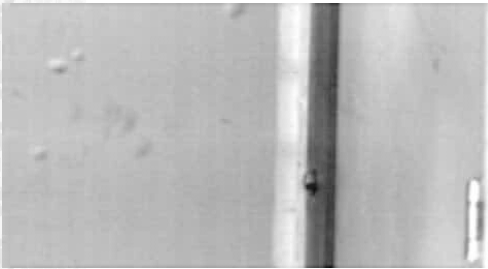
ROPS/FOPS/OPS



Safety



Thrown Objects



Features

Prime mover

- Rubber-tired
- Steel tracked
- Rubber tracked
- Skidsteer

Prime mover

Features

Cutter head

Pro's and Cons (p. 13)

Vertical Shaft

- ✳ Less hp
- ✳ High stubs
- ✳ Flying objects
- ✳ Longer machine
- ✳ Lighter machine
- ✳ Less maintenance
- ✳ Cheaper
- ✳ Diameters < 10"

Horizontal Shaft

- ✳ Higher hp
- ✳ Cut into ground
- ✳ Throws into ground
- ✳ Shorter
- ✳ Heavier
- ✳ More maintenance
- ✳ Expensive
- ✳ Diameters to 30"

Features

✳ Teeth




Vertical-Fixed blade







Chips are not all chips







Features

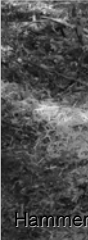



 Mounting: 3-pt hitch, loader, boom





Features


 Operating method

Hammer
 Fixed tooth, multi-pass

Also ...

- Operator experience
 - Forestry knowledge
 - Seat of the pants
- Contractor Overhead/Support
 - Fuel/maintenance truck
 - Fittings

Leased Equipment



Carbon Sequestration



Not Ready for Prime Time



Functioning Ecosystem



Francis-Marion NF
